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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 09/783,059 | 02/14/2001 | Tapani Ryhanen | 297-010113-US(PAR) | 9629 |

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EXAMINER

BETTENDORF, JUSTIN P

ART UNIT PAPER NUMBER

2817

DATE MAILED: 11/15/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/783,059

Applicant(s)

RYHANEN ET AL

Examiner

Justin P. Bettendorf

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 03 September 2002.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 2,3,7-24,27-32 and 43-49 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 2,3,7-24,27-32 and 43-49 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☒ The proposed drawing correction filed on 03 September 2002 is: a) ☒ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s) _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ 6) ☐ Other: _____

DETAILED ACTION

Claim Objections

1. Claim 45 is objected to because of the following informalities: Claim 45 recites "the said electrode (601, 602, 603, 604) is a metal film" which could cause confusion because the reference characters in the parentheses are given no patentable weight. Perhaps, the claim should state --each of the electrodes (601, 602, 603, 604) is a metal film--. Appropriate correction is required.

Claim Rejections - 35 USC § 102

2. Claims 27, 28, 31, and 45-47 are rejected under 35 U.S.C. 102(b) as being by anticipated Ishige et al. (EP 0725 408 A2 of record).

As noted in the Office action of paper no. 7, figures 14(a), (b) show the claimed micro-mechanical tunable capacitor that includes: a flexible, electrode 14; counter-electrode 4 closer to electrode 14 than tuning electrodes 10 and electrodes 13/14. The substrate 9 is made of glass or other insulating materials (col. 15, lines 35-53). The reference discloses that an insulation film is on the surfaces of the electrodes including 4 (see col. 13-14, lines 58-2). The active electrode (e.g. 14) is positioned in the middle, farther from the sides than tuning electrodes 10. With respect to claim 28, the electrodes are made of thin-film Al (col. 1, lines 17-19 and col. 6, lines 34-36).

Claim Rejections - 35 USC § 103

3. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

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4. Claims 29, 30, 32, and 49 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ishige et al.

The Ishige et al. reference discloses a tunable micro-mechanical capacitor with a thin connecting portion 15 that goes from two levels and acts as spring (see col. 13, lines 23-25). However, the reference does not explicitly show folded-over or corrugated structure as recited in claims 29 and 30.

Nevertheless, such structures are well known for springs.

Accordingly, it would have been obvious to one of ordinary skill in the art at the time of the invention to have substituted the well-known corrugated spring structure in place of the spring structure 15 because such a modification would have been considered a mere substitution of art-recognized equivalent spring structures. With respect to claim 32, the Ishige et al. reference suggests using silicon substrate in place of glass for some of the embodiments (col. 14, lines 14-22); therefore, it would have been considered a mere substitution of art-recognized equivalent substrate materials for the embodiment of figures 14(a)-14(b). With respect to claim 49, the reference discloses one of the capacitor electrodes 4 as being nearly on the same layer as the tuning electrodes 10 (the capacitor electrode 4 may be considered an "active" electrode because it may be used in a circuit (i.e. claim 49 does not require the "active" electrode to be the flexible electrode). The reference further suggests that the electrodes may be placed farther apart for greater range of capacitance values (col. 16, lines 9-11). Accordingly, it would have been obvious to one of ordinary skill in the art at the time of the invention to have removed the base 22 in order to increase the available capacitance values thereby suggesting the obvious modification.

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5. Claims 2, 3, 7-21, 24, 43, 44, and 48 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tham et al. United States Patent No. 6,049,702 in view of Ishige et al. (all of record).

Figure 5a of Tham et al. shows a resonator with variable inductor and capacitor which uses MEM technology (col. 6, lines 60-68). Figures 6g and 7g show a combined capacitor/inductor resonator with planar inductor having turns 164 on a certain layer and capacitor electrodes on other layers with 153 providing connection between the capacitor and the inductor (see col. 8, lines 31-55). However, the embodiment of figure 5a shows a switched variable capacitor instead of the claimed structure.

Nevertheless, as noted above, the Ishige et al. reference teaches the claimed variable capacitor that includes insulation films on the parts of the electrode that may touch (see cols. 13, 14 lines 58, 59 and 1-5). Such a variable capacitor advantageously takes less substrate space than multiple switched capacitors, as would have been well known.

Accordingly, it would have been obvious to one of ordinary skill in the art at the time of the invention to have substituted the art-recognized equivalent variable capacitor of Ishige et al. in place of the switched variable capacitor in the resonator of Tham et al. because such a substitution of art-recognized equivalent variable capacitors would have taken up less substrate space thereby suggesting the obviousness of the modification.

With respect to suspended capacitors/inductors (e.g. claims 5-7), such an arrangement is conventional in order to reduce parasitics.

With respect to the material of the isolation film (e.g. claims 12 and 13), both silicon nitride and polymer materials are conventionally used; therefore, because the reference (i.e.

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Ishige et al.) is silent on the type of the material used, any conventional equivalent material would have been usable such as silicon nitride and polymer.

With respect to claim 19, the Tham et al. reference teaches that the inductor coils 164 should be made as thick as possible but the MEM active electrode should be much thinner (see col. 9, lines 55-68). Electroplating and sacrificial layers are considered process steps that are given no patentable weight.

1. Claims 22 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tham et al. in view of Ishige et al. as applied above, and further in view of Bozler United States Patent No. 6,127,908.

As noted above, the Tham et al./Ishige et al. combination shows the claimed variable capacitor and inductor resonator but does not show the claimed switched inductor coil segments.

Figure 13A of Bozler shows a variable inductor 1300 with MEM switched 1302 devices for changing the no. of active segments (see col. 12, lines 26-37).

Accordingly, it would have been obvious to one of ordinary skill in the art at the time of the invention to have substituted the art-recognized equivalent variable inductor of Bozler in place of the switched inductor of Tham et al./Ishige et al. because such a modification would have been considered a mere substitution of art-recognized equivalent variable inductors.

Response to Arguments

2. Applicant's arguments filed 9/3/02 have been fully considered but they are not persuasive.

The applicant argues that there is no disclosure in the Ishige et al. reference of using an insulating layer in the tunable capacitor.

This argument is not persuasive. The applicant's attention should be drawn to columns 13 and 14, which describe such an insulation film "layer" on the electrodes (lines 58-2).

The applicant also requests a reference showing a corrugated spring structure.

The Yao et al. reference (of record) shows an example of a corrugated spring structure in figure 10.

The applicant also asserts that there would be a manufacturing problem in combining both semiconductor and MEM techniques.

This argument is unpersuasive because it is an unsupported assertion. Moreover, the variable capacitor of Ishige et al. is considered a MEM device similar to the device of Tham et al. Also, both references disclose using semiconductor techniques in manufacturing (see Ishige et al. col. 16, lines 22-24 and Tham et al. col. 4, lines 39-64).

The applicant further argues that there is no motivation to combine the two references.

This argument is not persuasive because the variable capacitor of Ishige et al. is an art-recognized equivalent variable capacitor to the one of Tham et al. Therefore, an express suggestion to substitute one equivalent component for another is not necessary to render such substitution obvious (see MPEP 2144.06). Additionally, the Ishige et al. reference gives an advantage of using a variable capacitor having a flexible electrode, viz. that it takes up less space than multiple element variable capacitors (col. 2, lines 3-10).

Conclusion

3. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

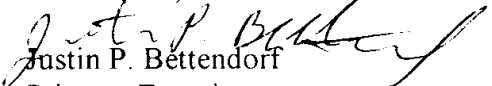
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A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Justin P. Bettendorf whose telephone number is (703) 308-2780. The examiner can normally be reached on 6:00-3:30 (M-F, 1st Friday off).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robert J. Pascal can be reached on (703) 308-4909. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7722 for regular communications and (703) 308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.


Justin P. Bettendorf
Primary Examiner
Art Unit 2817

jpb

November 14, 2002